

## MIXED METHODOLOGY: THE SHIFT OF PARADIGM IN UNDERSTANDING FRAGMENTED VIEWS OF HOUSEHOLDS RECYCLING BEHAVIOUR

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### ABSTRACT

*This doctoral study explicates an interdisciplinary approach with applied mixed methodology stance on research in recycling behaviour and households recycling waste system. It is argued that a mixed paradigm in this interdisciplinary fields is far accessible to a mono paradigm conventional approach because: (1) it provides a more accurate description of how knowledge is actually generated in the field, (2) it offers a more holistic approach to the evaluation of knowledge claims in the discipline, and (3) it suggests a robust framework that accessible for multidisciplinary or cross-disciplinary research.*

**Keywords:** *mixed-methodology, interdisciplinary approach, households recycling behaviour*

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### 1. Introduction/Background

The tradition of mixed methods within social and behavioural research is the disagreement with mono-methodology approaches in answering the social phenomenon (Venkatesh et al., 2013; Ågerfalk, 2013; Mertens and Hesse-Biber, 2013; Golicic and Davis, 2012; Spens and Kovacs, 2012; Cameron and Molina-Azorin, 2011; Onwuegbuzie et al., 2010; Clark et al., 2008; Creswell, 2008; Hanson et al., 2005; Tashakkori and Teddlie, 2002, 1998; Greene et al., 1989). Thus, by applying this methodology allows the meta-inferences between richness of qualitative findings with robustness of quantitative data. It gives the holistic dimension to clarify the social assumptions.

Needless to say, this methodology approach support innovative ways in looking research design and creating triangulating effect on confirming constructs thus giving validity and reliability scarcely received in qualitative approach and a meaningful confirmatory resonance in quantitative approach (Mertens and Hesse-Biber, 2013; Onwuegbuzie et al., 2010; Creswell, 2008; Tashakkori and Teddlie, 1998).

The motivation of this study is the need to explain there is *symbiosis effect* between the provider (municipalities) and end-users (Households) in attaining sustainability. Whereby, sustainability has become an important concept for twenty-first-century organizations (Abbasi and Nilsson, 2012; Bjørn and Hauschild, 2013). In response to this, many organizations faced pressures from multiple stakeholders to sustainably manage their economic activities (Grant

et al., 2013; Oberhofer and Dieplinger, 2013; Lozano, 2013). Some of these organizations employ strategic supply chain management that emphasize on reverse logistics (RL) in pursuing sustainability (Grant et al., 2013; Carter and Easton, 2011; Linton et al., 2007).

The work of Carter and Ellram(1998b) perceptively argued with regard to reverse logistics (RL) that study should be interdisciplinary [some writers referred to it as multidisciplinary or trans-disciplinary (Zscheischler et al., 2014)]. A single discipline study has limited ability assess the complex multifaceted issues involved in managing households' waste pattern and recycling behaviour. Thus, to draw a general conclusion from a single study may be difficult and reflect a limited perspective (Choptiany et al., 2014). Therefore, an interdisciplinary approach may provide a broad and robust understanding of the interactions among the key factors (end-users, facility and services) in backward flow. Interestingly, Jahre(1995) revealed the need for a reverse logistics perspective within the household recycling waste system (HRWS) domain and commented on the marginalization of this domain in logistics literature (Cherrett et al., 2010). This has provided the impetus to explain the relationship between HRWS and householders by proposing a "symbiosis effect" perspective.

## **2. Literature Review**

### **2.1 Household Recycling Waste System**

In the UK, household waste is regarded as part of municipal solid waste (MSW) and the *Department for Environment, Food and Rural Affairs* (DEFRA), consistent with the European Union's waste policy (EU27) defines household waste is household waste and business waste where collected by the local authority and that is similar in nature and composition as required by the Landfill Directive (DEFRA, 2011c). Thus, households recycling waste system (HRWS) involve two main players, householders and their municipalities. Understanding both of these players is crucial for developing sustainable refuse management options; subsequently, reduction of landfill usage, and smooth backward flows of recycles as well as energy recovery opportunity within HRWS (Miranda and Hale, 1997; Lindqvist, 2013).

The essence of the waste problem explored in this study is that if by definition waste is something that is not wanted, achieving a coherent sustainable solution to its management requires a combination of regulatory responsibilities and appreciation of social norms (Deutz and Frostick, 2009). Thus, the movement of waste management towards sustainable refuse options requires more than a technological or operational innovation, but also changing social norms (Barr et al., 2005). RL is mainly concerns on disposition of end-of-life products and packaging waste that are flowed from end-users to main logistics stream within SCM. However, Stock (1998) also in (Kroon and Vrijens, 1995) that further included the activities of waste movement or diversion, physical distribution and materials management into the definition of reverse logistics: "*the role of logistics in product returns, source reduction, reuse of materials, materials substitution, waste disposal, recycling, refurbishing, repair and re-manufacturing*" (p.20).The waste movement and diversion is closely similar to HRWS activities (Fuller, 1978) as well as processes.

### **2.2 Households Recycling Behaviour**

In HRWS, households' behaviour is influenced by situational and personal factors. The projection (elicitation/ manifestation) of the recycling behaviour is derived mainly within

personal state of mind of the households (do Paço et al., 2013; Thøgersen, 2006). There are many factors that contribute to HRB. These factors may vary from

- a. Reverse logistics (types of disposals, accessibility, method of disposals, level of difficulty, level of separation or sorting) (Cherrett et al., 2010),
- b. Marketing (awareness, information, advertising, household engagement) (Biswas et al., 2000),
- c. Social Norms (Values) (perceived pressure, community intervention, local interest group, public pressure) (Biel and Thøgersen, 2007),
- d. Individual [Demographic Background (age, education, income, location), Knowledge (product, package, environmental impact, product life cycle, recycling method) and Self Efficacy] (Swami et al., 2011) and
- e. Policy Instruments (directives and economic incentives or benefits)(Stewart, 2011)

In reverse logistics, end-users (households) are responsible to supply the returnable and recycles. It is crucial for municipalities and RL operators to acknowledge that consumers' participation in assuring the quality and the quantity of returnable and recycles movement are efficient and effective (Brito et al., 2004; Dowlatsahi, 2000). Jahre(1995) tried to come up with better understanding of RL roles by examining marketing integration in households recycling. Nevertheless, Jahre's work is at least a pioneer to cross over the RL theory in households recycling waste system. However; more of empirical evidences needed to support RL roles as well as marketing function in driving the movement of recycles from HRWS (Carter and Ellram, 1998b). Even in Murphy and Poist(2003) suggested that the interaction between consumer and RL (the personal and situational factors) has a positive impact on the environment. The lacking of appropriate model to examine both factors holistically has encouraged new researches to develop more cohesive model by abduction of theories (Stock, 1997) and theoretical frameworks (Park and Ha, 2014) that may lead to insightful investigation as well as robustness in the chosen research approaches (Carter and Ellram, 1998b; Mangan et al., 2004).

### **3. Methodology, Findings, Analysis and Discussion**

#### **3.1 Methodology**

The interdisciplinary nature of the study is accessible by applying a mixed methodology approach (Ågerfalk, 2013; Golicic and Davis, 2012). Thus, this approach is applicable in explaining a socially formed HRB is *depending upon situational factors as a sustainable HRWS as HRWS is depending on HRB*. Philosophical assumptions derived from this study are objectivism and subjectivism; however, the right paradigm with the right methodology may not restrict the notion of having two research methods to answer the research objectives (Greene et al., 1989; Cavaye, 1996; Deetz, 1996; Remenyi, 1998; Healy and Perry, 2000; Holden and Lynch, 2004). First applying positivism stance by designing the research using Kolakowski rules of positivist (1972) in quantitative approach, states that positivism embraces four point doctrines (the rule of phenomenalism and nominalism: the unity of scientific method and separation of fact and values). This positivist doctrine best fit partially for this study and has emphasized in quantitative phases in *Sequential Explanatory Design*.

On other hand; the second paradigm, interpretivism is seeking human interpretation on world where they seek meanings in natural setting and addresses researcher's reflexivity discourses between subject and subject matter. The in-flows of themes are interplay in the discourses

observed; therefore, the data interpretation are *phenomenological* influences the nature of these discourses (Roulston, 2010). Thus, in applying qualitative approach is extending rigorous element in explaining research assumptions especially in behavioural studies and specifically examining relationship between subject and subject matter.

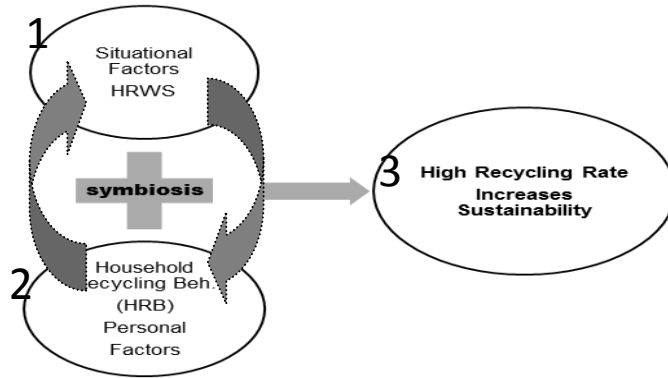
Nevertheless, this research not taking sided with paradigm dichotomy or even is being in a middle ground (pragmatism) but to embrace the “goodness” of both worldviews in making sense of the research assumptions.

### 3.1.1 The Proposed Theoretical Framework

The interdisciplinary approach proposed for this study for understanding the backward flow’s social actors or key players involves the overlapping of many disciplines and areas (Dowlatshahi, 2000; Carter and Ellram, 1998b). An extensive literature review was conducted in order to identify research gaps and find a robust model to replicate or extend the proposed conceptual model. It has to address two distinct aspects, the mechanistic (situational or system) and the organic (personal or behavioural). Thus, the proposed “symbiosis effect” model is an embodiment of many theories. First, it applies the *Theory of Planned Behaviour* (Ajzen, 1991), which explain that human behaviour depends on personal and situational factors; however, the theory is lacking in explanations of behavioural change (Sniehotta, 2009).

Second, it applies the *Norm Theory* (Stern et al., 1995) that explains personal norms activated by situational cues. However, while it explained the cognition of individual’s norms, it does not explain the interaction processes between the situational cues and individual’s norms. Third, it applies the *Environmental Significant Behaviour* model (Thøgersen, 2006), which explains that environmental behaviour can be manifested by the degree of social and personal norms. However, it excludes the level of “presence” of situational factors and Thøgersen’s work is more concerned with individual’s environmental behaviour that goes beyond the scope of recycling behaviour in general. The three theories (Ajzen’s, Stern’s and Thøgersen’s) are robust for developing a “behavioural” conceptual framework or a model in social science research. However, they are inadequate for this particular study. Therefore, those three theories are combined with the *Behavioural Perspective Model* (Foxall, 1999a), which explains how situational factors or setting influence behavioural changed as well as Carter and Ellram (1998b) reverse logistics framework. This interdisciplinary approach balances the mechanistic and organic aspects of the study.

This framework will be used to explore the role of the two major players in HRWS in pursuing sustainability (Fig. 1.2). The dotted arrow in Figure 1 proposes the emergence of a symbiosis effect arising from the interactions between situational and personal factors, as a pre-conditional phase. The framework illustrates that situational factors require to be visible first (1) then (2) the personal factors conform, leading to the pre-condition phase (symbiosis effect). As a result (3) will be the outcome of the HRB, depending on the degree to which situational factors co-exist in the concomitant setting.



**Figure 1: Theoretical Framework**

The methodological approach for accomplishing the research objectives requires a cross-examination of two data sources (qualitative interviews and quantitative questionnaires) because the recycling systems and household recycling behaviour that can be quantified and observed directly are viewed as reality without the need for subjective interpretation (positivist) (Schrag, 1992). However, this reality is governed by the different attitudes, perceptions and interpretation of the reality by different individuals (interpretive) (Guba and Lincoln, 1994).

### 3.1.2 Research Design

The basis of the study design is a sequential exploratory design known as Qual-Quan-Qual (Creswell, 2008; Clark, et al., 2008). Two municipalities were chosen from the North of England (the East Riding of Yorkshire and the City of Hull). A total of fourteen respondents participated in the first stage of data collection ( $n=14$ ): two of those were municipality officers – one each from the East Riding of Yorkshire and the City of Hull. The remaining twelve respondents were demographically diverse and lived or used to live in the East Riding of Yorkshire and the City of Hull. The second stage was a quantitative approach ( $n=412$ ) which a postal-survey questionnaire was sent to 500 households from each area. In addition to reduce the impact of the low response rate normally associated with postal surveys, an online survey was published via the University of Hull's social media platforms, the local municipalities' affiliated community networks, public community online news network (e.g. 'this is Hull and East Riding') and under the discretion of selected companies within the population parameters (e.g. Kingston Communications, East Yorkshire Motor Services, and Jackson's Bakery). Table 1 provides a socio-demographic profile of respondents.

Table 1: Demographic Background ( $n=412$ )

Item	N	%
<b>Age</b>		
20 or under	21	5.1
21-30	85	20.6
31-40	96	23.3
41-50	59	14.3
51 or older	151	36.7
<b>Gender</b>		
Male	157	38.1
Female	255	61.9
<b>Recycling Experience (years)</b>		
More than 4 years	307	74.5
Less than 4 years	105	25.5
<b>Living in current property (years)</b>		
More than 4 years	286	69.4
Less than 4 years	126	30.6

The sample was slightly dominated by female respondents (61.9 percent) and the majority of respondents fell in the 51 or older age group. Most respondents have more than four years of recycling experience (74.5 percent) and were living in the same property for more than four years (69.4 percent). Then the final stage of the research design in data collection was a focus group developed to cross validates the earlier phases. A 15 respondents were randomly recruited with a small token for participation ( $n=15$ ).

## 3.2 Findings and Analysis

### 3.2.1 Qualitative Finding: Stage 1

Using thematic analysis (Braun and Clarke, 2006) network as mean of interpretation helped to map the main themes emerged from the first stage (Fig. 2). The key themes as emerged in the study were categorized to situational and personnel factors and enablers for the existence of symbiosis effect. Nevertheless, the richness of the qualitative findings led to extending the thematic analysis in using ethnographic analysis: semantic relationship between themes (Roulston, 2010; Aronson, 1994); helped to explain the existence of symbiosis effect between councils and households.

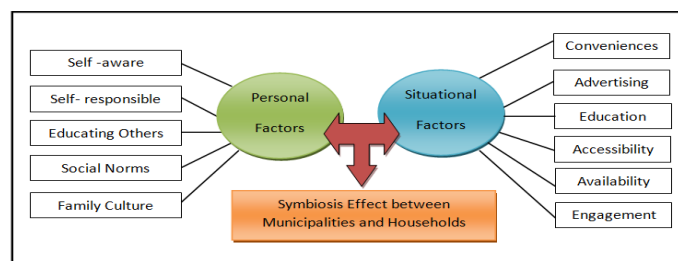


Figure 2: Thematic analysis network of Conceptualization on *Symbiosis Effect* between Local authorities and Households ( $n=14$ )

The first type semantic relationship existed in this study was the cause and effect (X is a result of Y, X is a cause of Y: X is HRB and Y is engagement of the recycling services by councils). Most respondents had knowledge of recycling, were fully aware of their consumption patterns, and also what they placed in their bins. Those who had experienced the transition from the one bin scheme to a new three bin scheme introduced by the local authorities were initially reluctant to participate due to a perceived lack of effort to engage

residents by their local authority. However, over time councils did improve their engagement and communication that lead to HRB increases.

The second type of semantic relationship was rationale (X is a reason for doing Y: X is marketing and logistics initiatives by the councils and Y is recycling). This scenario supported the symbiosis or interdependencies between systems and behaviour. Some of the respondents were from Germany, which has a very systematic waste and recycling management system, and they expressed an affective/emotional motivation that (Burgess, et al.,1998) defined as “guilt” for not recycling as much as they would in their home country . This may be due to the fact that stimuli for recycling behaviour from current local authorities’ logistics and marketing initiatives were not as aggressive as they had experienced before.

### 3.2.2 Quantitative Finding: Stage 2

The frequency analyses showed more than 90 percent of households were clearly aware of why they recycled; the majority of households recycled because they believed recycling improved the environment and a feeling that they should live in an environmentally-conscious society. The study also looked for any differences between the local authorities regarding their reasons for recycling. It found the number of principal reasons (environmentally- concerned) for City of Hull residents was somewhat higher than for those living in the East Riding of Yorkshire (Fig. 3). In the ‘others’ option City of Hull residents were inclined towards ‘up-cycling’ such as reusing most of the recyclable items or giving those items to extended families or friends. The East Riding of Yorkshire households were more likely to send their reusable items to various charities.

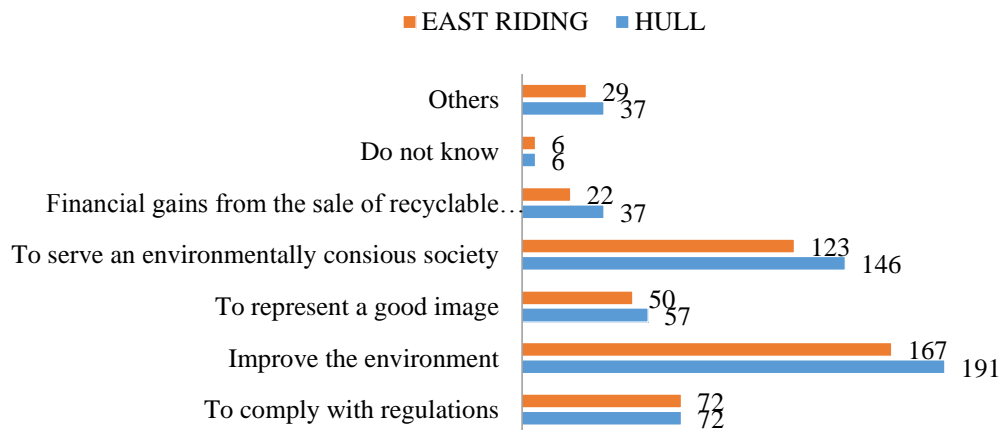


Figure 3: “I recycle because \_\_\_\_\_” based on local authority (n=412)

This study seeks the reasons behind the householders’ recycling initiative by examining confounding variables (demographic factors). Logistic regression was used to test the full model against a constant model. The results from the full model indicate that householders’ reasoning for HRB depends on changes in some demographic factors (one unit increase); they are likely to change their reasoning for HRB based on regulation if they are (double occupants:  $Wald = 4.48, p < 0.05$  with  $df = 1$ , ora student:  $Wald = 7.76, p < 0.01$  with  $df = 1$ ); as well as reasoning based on environment if they are (living in current address more than 4 years:  $Wald = 4.44, p < 0.05$  with  $df = 1$ , or they started recycling as the scheme was introduced:  $Wald = 4.47, p < 0.05$  with  $df = 1$ ) and their reasoning based on self-image if

they are (working:  $Wald = 4.49, p < 0.05$  with  $df = 1$ , or unemployed/on benefit:  $Wald = 3.99, p < 0.05$  with  $df = 1$ ). The overall model is significant at the 0.05 level according to the Model chi-square statistic. The model predicts reasoning for regulation (65%), environment (86.9%) and image (74.3%) of the responses correctly. The Nagelkerke's for regulation ( $R^2 = 0.12$ ), environment ( $R^2 = 0.13$ ) and image ( $R^2 = 0.09$ ) implied the model is a moderate improvement over the null model with no predictors even though Nagelkerke's Pseudo  $R^2$  is skewed to zero than one.

A Pearson's correlation was used to analyse the relationship between situational and personal factors. Firstly, all items that constituted personal or situational factors were formed into relevant composite factors, and then a statistical correlation was tested between these composite factors including all demographic items. Those representing a more than a 0.05 significance level were omitted from further analysis. Table 2 demonstrates the correlation between these two composite factors. It shows that personal factors have a significant relation to situational factors ( $p < 0.01$ ) and vice versa; with positive correlation ( $r(412) = +0.41$ ). Four demographic items (Table 2) were also found to have positive relation with both factors ( $r(412) > +0.07$ ) and correlation between personal factors with those four demographic items has significant relation ( $p < 0.01$ ). However, household employment has significant influence at ( $p < 0.01$ ) on situational factors, thus households' age and marital status were at ( $p < 0.05$ ) significant level and recycling experiences had no significant correlation with situational factors. The analyses indicate that a socio-demographic profile of a municipal resident has a positive correlation with factors contributing to HRB.

Table 2: Correlation Table ( $n=412$ )

Factors	PEARSON CORRELATION					Sig. (2-tailed)
	Situational	Age	Marital Status	Employment	Number of Year Recycling	
Personal*	0.41	0.24	0.20	0.23	0.15	0.00
Situational*	1	0.10	0.12	0.17	n.s	0.01

\*Both factors are formed into composite factors (i.e. Item1 + item2+....)

Additionally, the study correlated composite personal factors with individual items of situational factors. The results show that the personal factors have significant relation with engagement ( $p < 0.01$ ) with positive correlation ( $r(412) = +0.71$ ); as well as convenience ( $p < 0.01$ ) with positive correlation ( $r(412) = +0.44$ ) and accessibility and availability ( $p < 0.01$ ) with positive correlation ( $r(412) = +0.27$ ). In order to examine whether personal factors interacted with situational factors (engagement, availability and accessibility), the study applied multiple regression analysis to question these assumptions. This analysis is relevant as it addresses assessment of various relationships, using the information from independent variables to improve the accuracy in predicting values for the dependent variable as recommended by Greene and Field (Green, 1991; Field, 2005). These analyses also reveal the existence of confounding variables (demographic items) in association with either personal or situational factors (engagement, accessibility and availability). Thus, when personal factors were predicted; it was found that engagement ( $\beta = +0.36, p < 0.01$ ), convenience ( $\beta = +0.11, p < 0.01$ ), and accessibility and availability ( $\beta = -0.13, p < 0.01$ ) were significant predictors of recycling behaviour (Table 3).



Table 3: Coefficients Table ( $n=412$ )

Model 1	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	15.093	1.851		8.154	0.000
Engagement	0.316	0.032	0.359	9.890	0.000
Convenience	0.156	0.048	0.106	3.225	0.001

### 3.3 Discussion

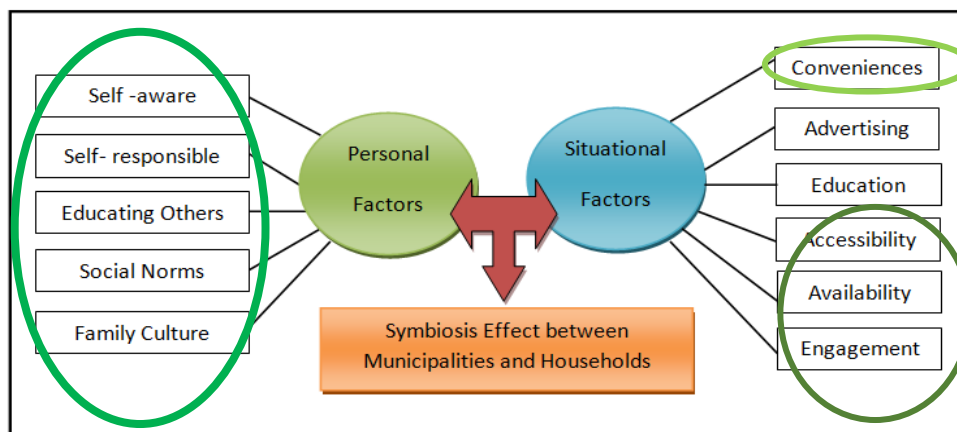
The findings indicate that a symbiosis effect exists that demonstrates household recycling behaviour will anticipate the changes made by councils' recycling schemes. Similarly, in Woodard et al (2005) where the councils introduced new schemes for 1000 homes (include one control group) and the new scheme resulted an improvement of 12% from previous percentage of recycles collected and the study was quite similar with Williams and Cole (2013) that explained two different schemes (co-mingled and sort/separate provisions) were trial out and the co-mingled option was reported an improvement of recycling and improving the waste reduction targets. Furthermore, the importance of interaction and engagement from council has shown an implication on the households recycling behaviour that similar to Brekke et al (2010) as the explained a social interaction is important to promote sustainable ascribed behaviour i.e. recycling behaviour and pro-environmental behaviour.

Whereby, the study explained moral responsibility is a structured and obligatory household (Culiberg, 2014) will be less willing to participate if there is an ambiguity in promoting recycling behaviour. Thus, perceived responsibility is found as a major determinant for households recycling behaviour and the "right" norm of recycling behaviour is influenced by personal factors (self-aware, family culture) (Park and Ha, 2014). The higher spatial coverage of availability and accessibility in recycling provisions and facilities increases the behavioural change as it has emerged during both qualitative analyses (thematic and ethnographic). For example, the element of availability and accessibility (logistics) and convenient (the ease of doing) is the most common themes and in semantic relationship that portrayed "cause and effect" and rationale introduced these mentioned elements were pre-condition factors (situational factors) have to be interacted with personal factors (self-aware, self-responsible, family culture).

This can be best explained by "*consumer behaviour setting*" model introduced by Foxall(1999b) that suggested behavioural change is manipulated by the situational setting and mediated by interaction between the socio-actors (Bhate, 2005; Foxall and Yani-de-Soriano, 2005). Thus, this study may not find extreme differences between two councils (City of Hull and East Riding of Yorkshire) however; it is a similar outcome (behavioural change and recycling performance) from both councils when they introduce the initial recycling scheme.

This first phase introduces the existence of interactions (symbiosis effect) between personal factors and situational factors. This is an initial proposition based on 14 interviews with two different type of qualitative analyses (Braun and Clarke, 2006; Sorrell and Redmond, 1995). Thus, the interaction as in Norm Activation Model (Biel and Thøgersen, 2007) described how human behave with situational factors as the determinants that the personal factors interact with situational factors; the recycling behaviour will transform accordance to how effective the situational factors were established (Kleinschafer and Morrison, 2013; Brekke et al., 2010). Therefore, first phase of the *sequential explanatory design* has established this proposition of symbiosis effect.

The inference statistical model from quantitative findings significantly explained the existence of interaction between accessibility and availability as well as convenience and awareness with personal factors as the main predictors. This is consistent with Bhate(2005) in juxtaposing the existence of situational factors to enable HRB and Woodard et al. (2001) to imply that the existence of situational factors without abandonment of the personal factors reflected positive HRB (Timlett and Williams, 2008; Barr et al., 2005). To project or manifest HRB, households must be motivated by the right stimuli such as the availability, accessibility, convenience and awareness or engagement of HRWS to increase recycling performance (Keramitsoglou and Tsagarakis, 2013). In addition, households' knowledge of recycling and how long they have been recycling positively interacted with situational factors and contributed to an improvement in HRB per Thorgesen(1994). In Thorgesen(1994) has developed a *model of recycling behaviour* that is extended version of Ajzen's TPB (1991) and confirmed that motivation for recycling is influenced by personal factors (ability and motivation) and situational factors (opportunity: overall and situational conditions). The symbiosis effect suggested by this study tries to explain vis-a-vis the "hygiene" factors conveying HRB, whereby the two factors investigated have to be interacting with each other in order for HRB to be projected. The quantitative phase analyses (Fig. 7.2) have confirmed the proposition of symbiosis effect from the first phase as well as the four research questions. The quantitative analysis demonstrates and validates the first stage finding the higher interactions and engagement influences sustainable HRB and a higher spatial coverage of service provision and availability of recycling facilities promote councils' performance in recycling initiatives (Fig. 4).



*Note: the green circles to show validation of themes from the first phase.*

Figure 4: the Validation of thematic analyses from the first phase between Councils and Households ( $n=412$ ).

#### 4. Conclusion, Limitations and Recommendations

This study has empirically shown the need to apply interdisciplinary approach and using mixed-methodology as the research stance for explaining the interaction between two distinct factors. Thus, it has limitation on the duration of the data collection process (6-12 months) that considerably short and it will be best to investigate further on longitudinal basis therefore, more explanation may be made for a possible new phenomenon. This study is an interplayed of many models and theories that contribute to a new framework (Fig. 8.1) and it is essential to apply this framework to many disciplinary to test the robustness and flexibility in addressing research problems. This study also uses *a-priori* measurements thus; it is an “embryonic” development whereby further replication is considered essential in future research. The population sample used a convenient and area sampling strategy thus it is a non-randomized sampling. Therefore, the generalization towards the whole population of Humber regions is implausible. Hence, with appropriate funding in understanding the UK households recycling behaviour base on symbiosis perspective may promote generalization and transferability throughout the region. The qualitative inquiries were done by the researcher hence, the researcher values and belief implicate on during discourses thus not to manipulate but as a medium to ensure the information is value-laden and to sustain “trust” among the participants.

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